ON SCENE

THE NATIONAL MARITIME SAR REVIEW

DEPARTMENT OF TRANSPORTATION

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PRELIMINARY REPORT ON LEEWAY PROJECT

In December 1974, the Coast Guard R&D Center released a preliminary report on the results of their investigations of small craft leeway. The following is a summary of that report.

The primary objective of the project is to measure small craft leeway by using time-sequenced aerial photographic recording of separation distances among small craft (less than 22 feet) drifting from a dye patch on the water. The dye patch is assumed free of windage (zero leeway) and moves essentially with the sea surface current. Any subsequent drift of the small craft away from the dye patch is caused by the action of the wind on the craft(leeway).

Five small craft (Mariner, Glastron, Barge, Silver Skif, and a rubber raft) were used in leeway experiments conducted in the coastal waters off Southeastern Connecticut. The following are summaries of the major results from 102 exercises.

1. The five small craft exhibited similar leeway as a function of wind speed. Although sail area, keel area and weight varied considerably among the craft, these variables had no measurable effect on leeway speed.

2. Leeway for small craft without a drogue (sea anchor) in the wind range of 5-20 knots may be computed from the expression

$$U_L = 0.07\ U_W + 0.04,$$

where U_L and U_W are the leeway and wind speed in knots.

3. The relationship between leeway and wind speed is complex at wind speeds below 5 knots. An expression for low winds has not been developed, but a linear interpolation between the leeway expected from 5 knots of wind and zero leeway for zero wind will provide the best approximation that can be postulated at this time.

4. Leeway of small craft with a drogue in the wind range of 5-20 knots may be computed from the expression

$$U_{LD} = 0.05U_W - 0.12,$$

where U_{LD} and U_W are the leeway and wind speed in knots, respectively.

5. Small craft drift off the downwind direction about 80% of the time. Once the small craft begins to drift to one side of the wind direction the craft tends to remain to that side of the wind during the drift, or until the wind shifts direction.

6. The drift angle for a specific small craft can vary by as much as a factor of seven at the same wind speed (direct downwind drift is considered to be drift of less than 5° off the wind line). This variation of direction occurs because of the many different headings the boat assumes to the wind, and the effect of the keel.

7. Small craft leeway appears to increase up to about 15% with increased sea state but the relationship has not been quantitatively established. Wave action is expected to have some effect on small craft leeway, but its contribution is in general difficult to separate from that due to wind speed. A detailed analysis of the effect of waves on small craft leeway was not attempted because of lack of precise sea state data.

CASE STUDY–OVERDUE OUTBOARD

A recent SAR case study for an overdue 17 foot outboard resulted in some interesting recommendations. The boat was overdue on a roundtrip fishing expedition from South Caicos in the British West Indies to Ambergris Cay. At the time the Coast Guard was informed, it was reported that volunteers had thoroughly searched the entire Turks and Caicos Islands by air and surface craft. (It was later concluded that too much faith was placed in this report). Searches were conducted by Coast Guard and Navy aircraft for four days without any results. Because of the report of the previous search, the primary assumption made during the search planning process was that the missing boat had been adrift since the day it became overdue. A day later the two survivors from the boat were sighted by a private fishing boat on the northern end of Ambergris Cay. They swam out to the boat, were picked up, and were returned to South Caicos. The boat was never found.

The survivors told how they had experienced an engine failure. They remained onboard the boat which was anchored close to White Cay for two days, after which they left the boat and swam north to a reef which stretches westward from Little Ambergris Cay. They then walked east along the reef to Little Ambergris Cay, where they spent the night. The next day they swam to Big Ambergris Cay. In all, the men reported seeing a Coast Guard helicopter and two civilian aircraft. The two survivors remained on Big Ambergris until they sighted the private fishing boat which picked them up. They survived on raw conch and "survival rations" they found on Little Ambergris Cay and brackish drinking water which they found on Big Ambergris Cay.

The following recommendations were made by the SAR Coordinator as a result of this case:

1. That all bearing information in SAR messages be specified as magnetic or true. During this case datum marker buoy locations were given by range and bearing but there was some confusion as to whether the bearings were true or magnetic. It was discovered later that some aircraft gave true bearings and others magnetic but none specified which type they were giving.

2. That datum marker buoy drift data for periods less than 12 hours be ignored. It has been our experience that data for lesser periods are extremely inadequate due to aircraft navigational error.

3. That searches for small craft overdue should always begin at the last known position when any possibility exists that the craft may be at or near that location. This search should have begun at South Caicos and included all anchorable depths of the Caicos

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LANTSAR 75

The Atlantic Air and Surface Search and Rescue Seminar of 1975 was held from 22 April to 25 April 1975. Sponsored by Coast Guard Commander Atlantic Area, the Seminar attracted over 400 delegates from more than 30 nations.

Photo: Vice Admiral W. F. Rea III, U. S. Coast Guard, Commander Atlantic Area, Search and Rescue Coordinator, U. S. Atlantic Maritime Region and Host, provides the Opening Remarks at LANTSAR'75.
(Seated at the head table from left to right: RADM R. H. Scarborough, Co-chairman; SecTrans Coleman; Commandant ADM C. W. Siler, and RADM G. O. Thompson, Co-chairman.)

From the keynote address by Secretary of Transportation William T. Coleman the Seminar moved briskly through a program of special presentations to all the delegates, detailed workshop discissions in five key areas, special displays and social events.

Photo: Secretary of Transportation William T. Coleman, Jr., making the Keynote Address at LANTSAR'75.

One of the outstanding general presentations was a live demonstration of satellite communications during which aircraft, ships, rescue coordination center and air traffic control center engaged in conference type radio communications via L-band satellite circuits using the ATS 6 NASA satellite. Thus, what was portrayed as only a possible dream at the 1970 Atlantic Seminar became an actual pre-operational demonstration at the 1975 Atlantic Seminar.

Photo: LCDR J. H. Discenza, USCG delivers his "Computerized SAR Assistance - AMVER, SARP & CASP" presentation at one of the several plenary sessions during LANTSAR'75.

Workshops were conducted in Operations, Communications, Safety Programs, Incidents and Oceanography. A great deal of concentrated discussions took place in these on SAR subjects falling under the workshop headings. Recommendations issuing from them dealt with such wide-ranging subjects as the possibility of an international technical association for SAR, education of the public on safety practices, the use of satellite communications for SAR, establishment of guidelines for SAR decision making and better methods of coping with the problem of search target drift at sea.

Photo: Coast Guard Captain C. F. Juechter, moderator of LANTSAR's Communications Workshop, listens to a question posed by an attendee before opening discussion for a possible solution.

The special exhibitors section provided delegates with access to manufacturers and others interested in placing something before the SAR public. A special feature connected with the exhibits was the free chance offered on a ship's clock for those who viewed all exhibits. A drawing for the clock was held at the closing session of the seminar.

Photo: A manufacturer's exhibit at LANTSAR 75.

The special attraction of the social events was the address at one of the luncheons by astronaut Bruce McCandless who gave a vivid picture of where our space program has been, where it is now, and where it is going.

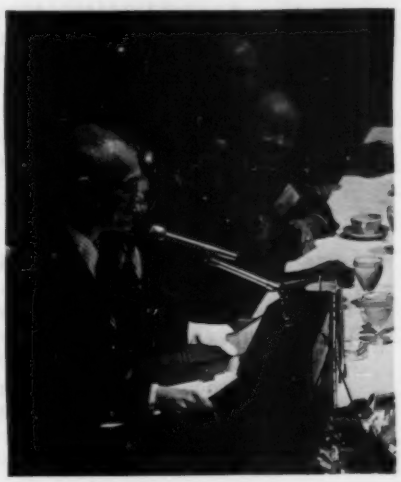

Photo: Luncheon guest speaker, United States Astronaut Bruce McCandless, addresses the attendees.

As a closing feature, Vice Admiral William F. Rea, Commander Coast Guard Atlantic Area and sponsor of the seminar, provided an open house for the delegates on Friday afternoon at the Coast Guard facilities on Governors Island. Delegates from other countries were able to view a good deal of the facilities which represent United States response to the topics discussed all week.

Photo: LANTSAR attendees from the Republic of South Africa, Commandant T. J. De Munnik, (l.) and LCDR Michael Warr (c.), question the AMVER Center watch supervisor during the open house visit to SAR facilities at Governors Island.

NEW ICAO ANNEX 12

The sixth edition of Annex 12 to the Convention on International Civil Aviation - Search and Rescue has been issued by the International Civil Aviation Organization. The sixth edition incorporates amendment 11 which was adopted by the ICAO Council on 25 November 1974, became effective on 25 March 1975 and will become applicable on 9 October 1975. It stems from a complete review of the Annex conducted by the ICAO Air Navigation Commission. The main changes effected by the Amendment are:

(a) reversal of the order of the existing Chapters 2 and 3 and relocation of a number of paragraphs;

(b) introduction of a new signal to surface craft and relocation of the search and rescue signals in a new Appendix to the Annex;

(c) introduction of requirements concerning provision of search and rescue service on a 24-hour basis, dissemination of information on position of merchant ships, and submission of appraisals of search and rescue operations;

(d) introduction of provisions aimed at improvement of co-operation in search and rescue between neighbouring States;

(e) introduction of requirements concerning equipment of rescue units, and availability of information on air traffic services, location of droppable survival equipment, methods for assisting aircraft in distress and being compelled to ditch to rendezvous with surface craft, and methods for assisting SAR or other aircraft to rendezvous with aircraft in distress; and

(f) deletion of a number of Notes whose substance is reflected in the ICAO Search and Rescue Manual.

WE'RE GOOD—WE MUST IMPROVE

By CAPTAIN C.B. HATHAWAY
Chief SAR Division
USCG Headquarters

Reading SAR Case Studies, Boards of Investigation and Congressional Inquiries could easily give one the impression that the Coast Guard's SAR program is in bad shape - that all we do is foul up one case after another. Actually these cases represent a very small percentage of the total; a rough estimate would be that well over 99% of our cases are completed quickly and successfully and usually without any need for Monday morning quarterbacking.

However, the 99% plus isn't much consolation to the few who are left overnight in the cold water. We can, and must, learn from our mistakes; and the start of another busy summer season seems like a good time to take a hard look at where we have fallen short and what we can do to prevent reoccurrence. Disregarding benefit/cost ratios and other assorted statistics, our real goal is to save everyone and everything whose trouble comes to our attention.

PROBLEM AREAS

Reviewing our less-than-perfect cases clearly demonstrates three points. First, once we find the object and the case becomes a pure rescue we make very few mistakes - a real tribute to some of the world's best sailors and aviators. If we could just quit getting lines in the screws, we'd have a near perfect record here. Second, our problems are mostly with initial reaction to reports of trouble and with searches, and these problems can be narrowed down to a very few common shortcomings. Third, we are often our own worst enemies in public relations; and I'm not talking about the PIO but about the average man on the operating unit. Even when we are taking appropriate action, we occasionally communicate so poorly that the rescuee and his friends think we're a bunch of lazy incompetents.

On the first point, this will not be a sermon on seamanship; there are hundreds of Boatswain's Mates who know as much about keeping lines out of screws as I do. Sea conditions and the awkward positions from which we're required to pull people increase the chances of putting a line in the screw. However, proper stowage of loose line on deck and constant attention to the hawser will do a lot to decrease it. Keep your eyes open - and THINK!

AWARENESS & INITIAL ACTION STAGES

The second point is worth a lot of discussion - more than I have space for or you have time to read. Our biggest problem seems to be blind reliance on established guidelines - treating them as hard and fast rules and on historical percentages. Overdues cause most of our problems. We know that many reported overdues turn up safe somewhere and that many of those we search for and find don't really have anything wrong. So we have a routine of pre-comm and ex-comm checks, often followed by a first light search. And almost invariably, when we lose somebody on a overdue it's because we blindly followed this routine. It's impossible to establish firm rules for overdues or for other initially vague cases such as flare sightings or distress calls without amplifying information. However, if any of the following conditions exist, we should consider junking the routine and taking some real action:

a. The weather is bad, or has been, during the time the craft was underway.

b. A person who has demonstrated that he goes where he said he was going, calls home frequently or has a real reason to return home is now unheard from.

c. Because of geography, weather, currents or other conditions in the area, a boat in minor trouble may quickly find itself in serious danger. Think of the worst possible situation.

d. There are a few hours of daylight left, but it will be dark by the time the comm checks are completed.

e. You have a boat or aircraft available now. (The main reason we conduct comm checks is that we don't have enough boats, aircraft or people to go charging off on every report of suspected trouble, but if your resources are sitting at the pier or in the hangar, that excuse isn't worth much)

When a search is indicated, there are a few other factors involved:

(1) Many survivors report that a search craft passed close by them but failed to see them. We have radar and are developing other exotic sensors but the human eye is still the best detection device in the inventory - if it's ksed correctly. Are your lookouts trained? Are your lookouts briefed on the probable - and all possible - objects of the search? (We often do not know whether we're looking for a boat or a head sticking out of the water) Are your lookouts rotated often enough? And, a very important point, are your lookouts motivated? Are they impressed with the fact that a man can get very cold, wet and thirsty waiting to be found, or have they been led to believe that they're wasting their time because the search object is probably safe in his favorite bar?

(2) Should we search at night? Don't rule it out just because you don't know that the boat has flares. People in trouble can think up some very ingenious ways of attracting attention when they hear an engine or see lights; and that sight or sound may be just what they needed to make them try to survive a few more hours. We are improving our air illumination capability - let's try it and use it. Admittedly daylight search is usually more effective and therefore is a more efficient use of resources. However, waiting a few hours - or a few days - gives you a much larger area to search, and that isn't more efficient use of resources.

Another problem is having incomplete or incorrect information - usually the result of poor communications - and failing to follow through to verify it. Because of this we have searched "45 miles" offshore instead of "4 to 5 miles" off and have, on at least one occasion, towed the wrong boat.

The final common error in the initial stages of a case is failure to use available resources. Helicopter air stations were established to provide quick response in dangerous areas, and response which is less affected by breaking surf and shoal water than a boat is. You know your local conditions and should recognize potentially dangerous situations. You'll burn less fuel flying now and finding the helo wasn't needed than you would on a search for survivors tomorrow. Know what non-Coast Guard assistance is available and notify it early in the game. Too many times we hear local groups say that nobody told them about the case. And if you see the possibility of an extended search, use CASP early. It takes a while to prepare the CASP format, so don't wait until the first search produced nothing. If you request a CASP solution and later don't need it, chalk it up to practice which we need.

PUBLIC RELATIONS

The third point is a tough one. Civilians involved in a boating mishap are usually upset. They often know nothing about the Coast Guard or SAR procedures. Our people are often tired and sometimes fed up with some of the ridiculous situations they've had to bail people out of. The potential for misunderstanding is great. There are ways to avoid misunderstandings and the resultant criticisms of the Coast Guard; for example:

a. When called by or about a SAR incident, copy the essential information, get something started, tell the caller what you've done, and copy the rest of the data. All you need to know before dispatching assistance is location, nature of distress, type of craft, and number of people. You can pass the color of the boat to the coxswain or pilot by radio, and he doesn't really care what the reporting party's phone number is.

b. Act concerned and eager to help. Don't irritate the public with a bored,

matter-of-fact attitude. It may be your 250th SAR case, but it's probably his first.

c. The public often expects a lot more service than the Coast Guard can, or should, provide. We should be careful to explain why we aren't doing what they suggest or why something didn't turn out the way they think it should have. We do not need any more publicity like, "The Coast Guard doesn't go out after dark", "They didn't seem to care", or "The Coast Guard gave me the run around".

GENERAL CONSIDERATIONS

The above points actually cover almost all the criticism and reports of unsatisfactory SAR performance received in Headquarters in the past year. It is mainly a matter of attitude. If we require people to prove they're in trouble; if we react like machines rather than intelligent humans; and if we put excessive emphasis on conserving our people, equipment and fuel, we'll continue to lose the ones we should have saved. This is not to say we should scramble the entire fleet every time the phone rings. However we should consider each case on its own merits, not as a stereotype; we should consider the worst situation and the chances of it occuring; we should consider the real long range effect of postponing action until we get more data; when initial action surprisingly produces nothing we should be suspicious of our information; supervisors should closely check each case that isn't quickly and satisfactorily resolved; we should use our resources; and we should display a concerned and intelligent attitude to the public.

In summary, THINK, and remember that you'll never hit the ball with the bat on your shoulder.

DITCHED PILOT SAVED

On 9 February 1975, an Aero Commander with an engine on fire ditched about thirty-three miles off Palm Beach, Florida with one person on board. A Coast Guard HU-16 was diverted and an HH-52 helicopter was launched from Miami Air Station. Miami Air Route Traffic Control Center (ARTCC) vectored a private aircraft to the scene immediately after the ditching and provided vectors for the HU-16. The private aircraft reported receiving emergency locator transmitter (ELT) signals but was unable to locate their source. When the HU-16 arrived in the area it was able to locate the pilot in a one-man life raft by homing on the ELT signal. The signal provided a strong steady DF steer from 10 to 15 miles away. The pilot and raft were visible from 1 mile away. The HU-16 then provided transmissions for homing by the helicopter. Upon arrival the helicopter made a rescue platform pickup. The pilot had been in his raft for only about 45 minutes.

The pilot reported that his right engine had caught fire and all attempts to put out the fire including propeller feathering, fire extinguisher discharge, side slipping of the aircraft, and various air speeds failed to extinguish it. He ditched the high wing Aero Commander about thirty-three miles offshore and managed to get into his raft, completely dry, before the plane sank.

This was an outstanding coordinated performance by Miami ARTCC personnel, the pilot of the private aircraft diverted to the scene, and the crews of the Coast Guard HU-16 and HH-52 helicopter. Miami Air Station opined that the pilot's decision to carry and utilize an ELT resulted in his rescue as soon as SAR units were in the area.

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Bank in spite of the delay involved in bringing the case to the Coast Guard's attention. The search should have then continued down the computed drift line, bringing in enough units to cover the possibility of maximum drift for the entire period. Too many times in the past the drift has not been as great as it was computed to be, tidal influences were greater than expected, actual time in which drift started was delayed by anchoring or other action of the persons on board, or drift was slowed by action of the persons onboard. The only possibility covered by Coast Guard units in this search was that of the target being adrift for the entire period it had been missing.

Case files and studies reveal that if survivors in shark infested waters can remain calm and employ proper defensive measures the risk of shark attacks can in some cases be reduced.

To avoid an attack by sharks one must first understand how they are attracted. Sharks have three main senses which are used to locate prey. In the order of use, they are (1) sound detection, (2) smell, and (3) sight. The sound detecting ability of a shark is sensitive enough to detect an explosive catastrophe many miles away and to "home in" on prey in dark and murky waters. The second sense, that of smell, is probably the main stimulus for a feeding frenzy. The scent of blood can be detected from a distance of one-quarter mile away. The third sense, that of sight, is mainly used in close quarters. The final attack in open-ocean waters is mainly directed by vision.

The behavior patterns of sharks are unpredictable because not only do they vary from one species to another but from individuals within a species. General behavior patterns indicate that a shark may attack an arm or leg of a swimmer without realizing that they are a part of a larger being. The chance of such an attack increases at night and in murky water.

In an open encounter a shark may circle and stalk a swimmer until it decides to attack, or if there is a presence of blood in the water sharks may be excited into a frenzy and attack anything in the water, including other sharks.

How can attacks be avoided? First, avoid making unnecessary noises that tend to carry underwater. If swimming is necessary use strong, steady strokes. However, as a last resort an agressive noise (slapping the water, yelling, firing a flare or gun) has, on occasion, deterred a curious shark.

To minimize detection by smell, stop the bleeding of any wound as soon as possible and avoid dumping refuse from a raft if sharks are nearby.

If a package of chemical shark chaser is available it should be used at the first sight of sharks. These packages will last for approximately three and one-half hours. After the danger of attack has passed, the inner cloth chemical bag should be replaced in the outer packet and closed. The normal duration of the shark chaser may thus be substantially increased. When using shark chaser, remain in the dye cloud, and do not allow any extremities to extend below it.

To defend against the shark's sense of vision one should remember that the larger an image with a minimum of attention-drawing contrast, the less likelihood of an attack. It is therefore important to stay fully clothed (bare feet dangling below a clothed person make attractive targets) and form a tight back-to-back group. This will give an image of a much larger swimmer, and if an attack is unavoidable, will permit the swimmer facing the shark to try and ward off the attack by striking the shark's sensitive areas (eyes, nose, and gills). Try to avoid striking a shark with bare hands except as a last resort because the sandpaper-like skin of a shark can easily damage the skin and cause bleeding.

Wanted: SAR Newsletters

Several SAR Coordinators have been sending us copies of the newsletters they publish. These have been valuable in that, from time to time, they contain information which should be disseminated on a wider basis.

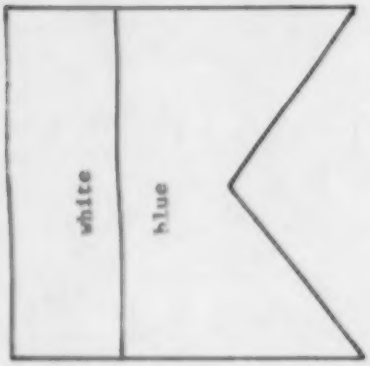
This is to request that any SAR Coordinators who publish a newsletter or bulletin send copies to us. If we print any items you will get credit for the articles.

BEWARE OF DIVERS!

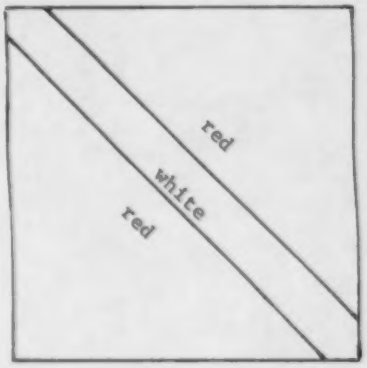
Coast Guard SAR vessels may encounter civilian craft engaged in sport diving. Because moving watercraft are a hazard to divers near the surface, a vessel serving as the diving platform normally displays a signal indicating diving is taking place. It is important for all Coast Guard personnel involved in surface operations to recognize the common sport diving signals and their meaning.

There are two different diving signals now used in and around the United States. The international code flag ALFA is used in international waters. A picture of this flag and the method of display is given in the International Code of Signals, H.O. 102. Display of code flage ALFA means "I have a diver down; keep well clear at slow speed".

The other diving signal is a rectangular red flag with a white diagonal stripe. This flag is commonly used by recreational divers and is required by law or regulation in about 25 states. The requirements vary for the size, shape and meaning of the flag. However, most states require approaching craft to come no closer than 100' - 150', operate at slow speed and exercise extreme caution in the vicinity of a vessel displaying the dive flag. In certain circumstances both of these signals may be displayed together.



INTERNATIONAL CODE FLAG ALFA



DIVE FLAG

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